FINAL

Appendix C
Design Investigation
Sampling and Analysis Plan

For the

Removal Action
High Street Outfall and 40th Avenue
Storm Sewer System

Vasquez Boulevard/Interstate 70 Site,
Operable Unit #2

Prepared for:

City and County of Denver
Environmental Quality Division
200 West 14th Ave, Suite 310
Denver, Colorado 80204

Prepared by:

Engineering Management Support, Inc.
7220 W. Jefferson Ave., Suite 406
Lakewood, Colorado 80235

June 19, 2015

REVIEWED AND APPROVED BY:

USEPA Remedial Project Manager and Quality Assurance Reviewer: _____ _____

Dania Zinner Date

DRAFT

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Project Manager:	_____	_____

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LIST OF ACRONYMS

ACM	Asbestos-Containing Material
COC	Compound of Concern
DADS	Denver Arapahoe Disposal Site
DVRs	Data Validation Reports
EPA	Environmental Protection Agency
FSP	Field Sampling Plan
PAHs	Polynuclear-aromatic Hydrocarbons
OU-2	Operable Unit #2
QA/QC	Quality Assurance/Quality Control
QAPP	Quality Assurance Project Plan
RAWP	Response Action Work Plan
RMP	Records Management Plan
SAP	Sampling and Analysis Plan
TCLP	Toxicity Characteristic Leaching Procedure
VOCs	Volatile Organic Compounds

1 INTRODUCTION

This Sampling and Analysis Plan (SAP) presents the purpose, objectives, and procedures for a sampling, laboratory analysis, and quality assurance/quality control (QA/QC) program for a Design Investigation that supports design and implementation of the "environmental components" of the barrier system associated with an open channel stormwater drainage structure planned to pass through and downstream of Operable Unit 2 (OU-2) of the Vasquez Boulevard/Interstate 70 (VB/I-70) Superfund Site. The "environmental components" of the barrier system are described in Section 1.1 of the Removal Action Work Plan (RAWP). Available Site Characterization information is presented in Section 2 of the RAWP. To avoid redundancy with the RAWP, reference is made to these two Sections of the RAWP for pertinent information. This SAP is Appendix C to the RAWP.

In accordance with EPA's *Guidance for Conducting Remedial Investigations/Feasibility Studies Under CERCLA* (USEPA, 1988), and for consistency with EPA's Quality Assurance requirements, this SAP consists of three parts. The first part is the Field Sampling Plan (FSP) that provides guidance for fieldwork by defining in detail the sampling and data-gathering methods to be used during the Design Investigation. The FSP is incorporated into this SAP as Appendix C-1. The second part is the Quality Assurance Project Plan (QAPP) that describes the policy, organization, functional activities, and quality assurance and quality control protocols that are necessary to achieve the objectives dictated by the intended use of the data collected during the Design Investigation. The QAPP is incorporated into this SAP as Appendix C-2. The third part is the Records Management Plan (RMP) that presents the approach, methods, and procedures for managing field data, design information, and project documents that are generated during design and implementation of the Removal Action. The RMP is incorporated into this SAP as Appendix C-3.

This SAP contains five sections, including this introduction. The purpose and objectives of the Design Investigation are discussed in Section 2. Data analysis, interpretation, and reporting are described in Section 3. A schedule for the investigation is provided in Section 4. Section 5 includes a list of references. As indicated above, The FSP, QAPP, and RMP are included as Appendices C-1, C-2, and C-3, respectively.

2 PURPOSE AND OBJECTIVES

As discussed in the RAWP, the purpose of the Design Investigation is to:

- Better characterize subsurface conditions through which the barrier system will be constructed;
- Provide information to better estimate the quantity and quality of waste material that will need to be removed;
- Better estimate the quality of groundwater that may be encountered during barrier system construction; and
- Assess the presence of and quality of soil gas that may need to be mitigated during construction.

Therefore, the specific objectives of the Design Investigation are to:

- Determine the areal extent and depth of waste material along the footprint of the proposed barrier system alignment;
- Sufficiently characterize the waste material for offsite disposal. Non-hazardous, solid waste disposal at the Denver Arapahoe Disposal Site (DADS) will require demonstration that the material will pass RCRA characteristic screens for ignitability, corrosivity, reactivity (cyanide and sulfide screen), oxidizers, and paint filter test, and TCLP toxicity for VOCs, PAHs, lead, and arsenic. In addition, samples that might visually appear to contain asbestos will be assessed for friable asbestos;
- Determine the potentiometric surface of groundwater beneath and adjacent to the barrier system;
- Characterize the quality of groundwater that may be encountered during construction to determine the need for and type of treatment required during construction; and
- Assess the methane and total VOC concentrations of soil gas that may be encountered during excavation and materials handling.

In general, the Design Investigation will consist of the following tasks:

- Surveying;
- Utility clearance;

- Advancement of soil borings while monitoring for soil gas;
- Collection of waste material from the soil borings for visual and chemical characterization;
- Off-site laboratory analyses of waste material;
- Installation of temporary piezometers in the boreholes;
- Measurement of groundwater levels and collection of groundwater samples;
- Off-site laboratory analyses of groundwater samples;
- Validation of laboratory analytical results;
- Data analysis and interpretation; and
- Report preparation.

Field sampling procedures and laboratory analytical methods are described in the FSP (Appendix C-1). Data validation procedures are described in the QAPP (Appendix C-2).

3 DATA ANALYSIS, INTERPRETATION, AND REPORTING

After the field activities are completed and laboratory analytical data received, a Data Summary Report will be prepared. The report will document the methodologies used and address results from the investigation. It is anticipated that the report will include:

- Boring logs;
- Field data sheets for each sample location;
- Photographs of waste material/soil cores and samples;
- Laboratory analytical results from solid and liquid samples, ACM testing results, and landfill gas field monitoring results. This will include laboratory data reports and an MSAccess database of the results;
- Data validation reports (DVRs) for the analytical results;
- Groundwater elevation data and potentiometric surface maps;
- Estimates of the quantity and quality of waste material that would need to be removed to construct and protect the barrier system;
- Estimates of the quality of groundwater that may be encountered during dewatering and a determination of the need for and type of treatment that would be required to satisfy discharge requirements; and
- An assessment as to whether soil gas may need to be mitigated during construction.

It is anticipated that the Data Summary Report will be organized as follows:

1. Introduction (purpose, Site background, report organization)
2. Design Investigation Activities (description of field activities and methodologies)
3. Design Investigation Results (results of investigation and evaluation and presentation of data)
4. Conclusions and Recommendations

Appendix A – Boring Logs, Field Data Sheets, and Photographs
Appendix B – Analytical Data and QA/QC Evaluation Results

All field and laboratory data, field records, technical evaluations, correspondence, and the Data Summary Report will be managed in accordance with the RMP (Appendix C).

4 SCHEDULE

A schedule for performance of the field work, offsite analytical and geotechnical testing, data validation, and preparation of the Data Summary Report is presented in Figure 7 of the RAWP.

5 REFERENCES

U. S. Environmental Protection Agency (EPA), 1988, Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA, EPA/540/6-08/004, OSWER Directive 9355.3-01, October.

Appendix C-1

Field Sampling Plan

Appendix C-2

Quality Assurance Project Plan

Appendix C-3

Records Management Plan